

a function can be selected in response to the movement and displacement of an operator's fingertip relative to the screen (1).

More particularly, this publication is concerned with the activation of a time circuit immediately when a finger or a fingertip touches the touch screen, where a particular movement direction and a particular distance of movement are detected and an electronic unit or the like is activated in response to these parameters.

The touch screen or touch panel (1) is provided along its four sides with light-emitting diodes (LED) (101-114) and light receiving devices in the form of phototransistors or photodiodes (201-214), as illustrated in FIG. 2.

The finger or the fingertip shadows one or more light beams orientated in a right-angled co-ordinate system, wherein shadowed light receiving devices and detected changes in shaded devices constitute magnitudes from which desired functions are evaluated and initiated.

SUMMARY OF THE INVENTION

Technical Problems

When taking into consideration the technical deliberations that a person skilled in this particular art must make in order to provide a solution to one or more technical problems that he/she encounters, it will be seen that it is necessary, on the one hand, to realise initially the measures and/or the sequence of measures that must be undertaken to this end, and on the other hand to realise which means is/are required to solve one or more of said problems. On this basis, it will be evident that the technical problems listed below are highly relevant to the development of the present invention.

When considering the earlier standpoint of techniques, as presented in the afore going, it will be seen that a technical problem resides in the ability to create conditions which enable a mobile telephone apparatus, or cell phone, to be provided with a touch screen that includes edge-related light-emitting units and oppositely located edge-related light receiving units together with associated circuits while retaining the small external dimensions of said apparatus, so that a geographical surface section and a function corresponding to said surface section can be established through the medium of a calculating unit, or computing unit, when certain light pulse receiving units do not indicate the reception of expected light pulses.

Another technical problem resides in the ability to create construction instructions that will provide conditions for reducing the space required by such a touch screen and for adapted planning and placement of said screen within the external confines of a mobile telephone.

A further technical problem resides in the ability to create conditions, with the aid of simple means, that enable energy consumption and power requirements to be kept low, with regard to the mobile telephone being battery powered, by generating short light pulses and by allowing the units to be activated sequentially in a chosen order.

In the case of this latter application, it will be seen that a technical problem resides in allowing the use of a number of pulse generating circuits, each connected to a respective light pulse emitting unit, and a number of light pulse receiving units, each connected to a respective pulse receiving circuit, and in the ability to establish, via a calculating unit, the geographic position of a user's fingertip, or thumb tip, on a front surface part, positioned so as to shadow one or more parallel, related light pulses and therewith indicate the

absence of light pulses in one or more light pulse receiving units and unit-related pulse-receiving circuits.

When considering the earlier standpoint of techniques as described above, it will also be seen that a technical problem resides in the provision of structural changes in a touch screen, such as to enable the screen to be significantly thinner than prior art screens, so as to adapt said screen directly onto a mobile telephone.

A further technical problem resides in the ability to provide a touch screen, with which, in respect of other external dimensions of said screen, it is possible to create conditions which enable the external measurements of a mobile telephone unit to be reduced while, nevertheless, enabling the width of the display surface of a display unit to be made larger than the display surface of known mobile telephone units.

A further technical problem resides in the ability to realise the significance of and the advantages associated with allowing an inventive touch screen to be used as an alternative, not solely for a typical keypad but also for a standard display surface of a mobile telephone.

Another technical problem resides in the ability to realise the significance of and the advantages afforded by utilising a display unit in the form of an LCD unit, so as to enable each "key" to be included on the screen in the form of a graphic, so that when a pen, pencil, finger or a fingertip is placed on the same location or surface section where a key is presented, a chosen function and/or application corresponding to said graphic is activated and generated.

Still another technical problem resides in the ability to realise the significance of and the advantages afforded by using an LCD unit, whose upper surface can be allocated different information carrying structures according to a chosen menu, for different sequences within an information transmitting mode.

Another technical problem resides in the ability to realise the significance of and the advantages associated with orientating said light pulse emitting units and said light pulse receiving units adjacent said display unit, with the transmitting and receiving directions of the light pulses being perpendicular to, or at least generally perpendicular to, a flat upper surface of the display unit.

Yet another technical problem resides in the ability to realise the significance of and the advantages associated with placing at least two, normally four, pulse-deflecting devices close to the display unit and to its mutually opposite edge portions.

Another technical problem resides in the ability to realise the significance of and the advantages associated with using as a supportive substrate a mobile telephone printed circuit board, that is capable of carrying an LCD unit or the like.

A further technical problem resides in the ability to realise the significance of enabling a substrate to support not only said display unit but also said light pulse emitting and light pulse receiving units, where said light pulses have a frequency within the infrared range (IR range).

Another technical problem resides in the ability to realise the significance of and the advantages afforded by enabling said light pulse emitting units and said light pulse receiving units to be connected to corresponding pulse generating circuits and pulse receiving circuits included in said substrate, through the medium of connection wires or the like.

Another technical problem resides in the ability to realise the significance of and the advantages afforded by allowing the light deflecting devices or light pulse deflecting devices to consist of a plurality of mirror units, co-ordinated with the casing of the mobile telephone unit.